

REMARKS

The Office Action mailed January 15, 2010, has been received and carefully considered. Independent claims 9 and 13 have been amended to define the invention with greater particularity. To the best of the undersigned attorney's information and belief, these changes contain no new matter for the reasons given in the remarks which follow.

Claims 9-16 are pending in the Application and are submitted to be in allowable condition. Claims 9 and 13 are independent.

Claim Changes and Support

Independent blue color filter claims 9 and 13 have been amended to recite, *"A blue color filter having a high transmissivity in a blue visible wavelength region and a low transmissivity in a green visible wavelength region"*. This finds support in the object of the invention, see page 4, the first full paragraph.

Independent blue color filter claims 9 and 13 have been amended further to recite, *"a first colorant that is a blue dye and that is represented by the following structural formula"*. This finds support in the sentence bridging pages 4 and 5 of the Application as-filed where the first colorant is identified as "a blue dye".

Independent blue color filter claims 9 and 13 have been amended additionally to recite, *"a second colorant that absorbs fluorescence from the first colorant at least in a wavelength range of 600 to 700 nm and does not have a fluorescence maximum in a visible wavelength region so that blue color purity is improved, and that is represented by the following structural formula (2)"*. This finds support in the sentence bridging pages 4 and 5 of the Application as-filed.

Independent blue color filter claims 9 and 13 have been amended further to recite, *"wherein the first colorant and the second colorant are completely dissolved in the binder resin so that scattering is reduced and transparency and contrast are improved"*. This finds support on page 13 of the Application as-filed in the paragraph below Table 1, the last two sentences.

I. The continuing rejection of claims 9-16 under 35 U.S.C. §103(a) as unpatentably obvious over Kobayashi (GB 2,349,388) in view of Nambe (US 5,506,357) is respectfully traversed.

1. Applicants note that the primary reference, Kobayashi et al., is Applicants' earlier Application that was brought to the U.S. Examiner's attention in an Information Disclosure Statement filed June 15, 2007. Clearly Applicants consider that the present invention is novel, useful, and unobvious over Applicants' prior disclosure for the reasons given in the following.

2. The Examiner points out that Kobayashi et al. discloses a blue color filter containing a first colorant (see page 5, the "first cyanine dye" of formula (1) with a ClO_4^- anion), a binder resin (see page 7, paragraph 1, "photosensitive resin"), and a second colorant (see page 6, the "second cyanine dye" of formula (2)).

3. The Examiner acknowledges that that the second colorant of Kobayashi et al. differs from that of Applicants' 1second colorant, formula (2), in two respects. First, the Examiner acknowledges that Kobayashi et al. disclose only alky substitution in the Y-position while the Y-position of Applicants' formula (2) is occupied by a sulfur atom (claim 9) or an oxygen atom (claim 13). Second, the Examiner acknowledges that Kobayashi et al. does not disclose any anion for the second colorant of formula (2).

4. The Examiner therefore relies on the disclosure of Nambe where structures labeled (4) and (5) by the Examiner represent cyanine dyes with a sulfur atom at the Y-position. The Examiner has not mentioned structures in Nambe where cyanine dyes with an oxygen atom at the Y-position, but it appears that Nambe does disclose such structures (see, for example, claim 1, Col. 41, line 30, and Col. 43, line 30). The Examiner additionally relies on the disclosure of Nambe Col. 4, lines 7-8, for coupling cyanine dyes with anions.

5. The Examiner justifies the combination of Kobayashi et al. and Nambe on pages 4 and 5 of the Action as a mere substitution of one cyanine dye for another with a reasonable expectation of success. The Examiner acknowledges that the disclosure of Nambe is in a different field of endeavor because the use of the dye is different, but argues that a chemist would look for analogous dye structures using a structure search.

6. Applicants respectfully disagree that modification of Kobayashi et al. with the known cyanine dyes of Nambe on page 5 of the Action is mere substitution, based on a routine

structure search looking for "analogous dye structures". Applicants believe that one of ordinary skill in this art seeking to solve Applicants' problem and provide a blue color filter for an EL device would not consider heterocyclic cyanine dyes "analogous" to the alkyl-substituted cyanine dyes of Kobayashi et al. because of an expectation of different properties, not similar properties as the Examiner maintains..

7. Applicants consider that only the hindsight gleaned from a perusal of Applicants' disclosure enabled the Examiner to search a different field of endeavor (Nambe), find disclosure of heterocyclic cyanine dyes, and modify the disclosure of Kobayashi et al. with the heterocyclic cyanine dyes of Nambe to arrive at a case of obviousness. Applicants consider that it is not permissible to use such hindsight where, as here, an artisan would not consider heterocyclic cyanine dyes "analogous" to the methyl-substituted cyanine dyes of Kobayashi et al. and would not have a reasonable expectation that materials useful in a different field of endeavor per Nambe would provide the solubility, transmissivity, and fluorescence properties, now recited in amended claims 9 and 13, sought in a blue color filter for EL devices.

8. The Examiner acknowledges that Kobayashi et al. modified by Nambe fails to mention that the first and second colorants completely dissolve in the binder resin.

9. The Examiner considers, however, that since Kobayashi et al./Nambe and Applicants use "similar pigments", the pigments used by Kobayashi et al./Nambe would also be expected to be completely soluble and meet Applicants' claims.

10. Applicants respectfully disagree.

11. Independent claims 9 and 13 specify that the first colorant is a blue dye. Dyes are generally soluble in contrast to pigments which are generally insoluble. Thus, since Applicants' first and second colorants are completely dissolved in the binder resin (a one phase system), the optical scattering that is typical when insoluble pigments are dispersed in a binder resin (a two phase system with interfaces) is advantageously reduced. Thus, the blue color filters of the present invention advantageously have improved transparency and contrast, as well as blue color purity, as demonstrated in the comparative tests presented in the Application. The desirability of this solubility feature is not disclosed in or suggested by Kobayashi et al./Nambe.

12. The Examiner appears to be using interchangeably the terms "pigment" and "dye", and "dispersing" (to obtain a two phase system) and "dissolving" (to obtain a one phase system)

in a loose manner. Applicants note, however, that “pigments” are generally insoluble unlike “dyes” which are generally soluble. Thus, “pigments” form two phase dispersions while “dyes” are soluble and form one phase solutions. In support of these distinctions, Applicants’ attach EXHIBIT A, an excerpt from The Condensed Chemical Dictionary, Ninth Ed., G.G. Hawley, page 321 (see “dispersion”) and page 686 (see “pigments”).

13. Further, while Kobayashi et al., page 1, lines 1-2, teach a blue color filter that includes a dye or pigment, Applicants found no disclosure in Kobayashi et al. of using colorants for blue color filters that are dissolved in the binder resin. For example, Kobayashi et al. page 8, lines 1 and 2, disclose use of the first cyanine dye of formula (1) as a dispersed pigment. Kobayashi et al. describe the first and second embodiments (see Kobayashi et al. pages 13 and 17-18, respectively) as made by spin coating a commercially-available photo-polymerizing resin containing a cyanine dye of formula (1) for the first embodiment and formulas (1) and (2) for the second embodiment, but Kobayashi et al. is not seen to teach using colorants for blue color filters that are dissolved in the binder resin or to suggest that an advantageously high contrast value would result from the colorants being dissolved in the binder resin rather than being or including dispersed pigment(s). The disclosure of Nambe is not seen to teach or suggest this feature and therefore does not supply the disclosure missing from Kobayashi et al.

14. For the reasons given in the foregoing, Applicants respectfully submit that the independent claims 9 and 13 clearly distinguish over the combined disclosures of Kobayashi et al. and Nambe so that no *prima facie* cases of obviousness against independent claims 9 and 13 has been made out, or against the claims depending from claims 9 and 13 for analogous reasons, so that this ground of rejection should be withdrawn.

15. In the alternative, Applicants believe that any *prima facie* cases of obviousness that may be deemed to exist is rebutted by the comparative test results presented on page 9-13 of the Application. The paragraph following Table 1 on page 13 of the Application discusses the significance of the comparative test results presented in the Application on pages 9-13 and summarized in Table 1. It is Applicants’ position that the blue color filters of the present invention and the organic EL devices including the same have an unexpectedly high contrast value that is believed to result from the colorants being completely dissolved in the binder resin. Since this feature was neither taught nor suggested by Kobayashi et al./Nambe, it is Applicants’

position that Applicants' comparative test results presented in the Application are sufficient to rebut any prima facie case of obviousness that may be deemed to exist. Thus,

14. In view of the foregoing distinctions and comments, Applicants respectfully submit that any *prima facie* cases of obviousness that may be deemed to exist has been rebutted by the comparative test results presented in the Application so that this ground of rejection of independent claims 9 and 13, and dependent claims 10-12 and 14-16 for analogous reasons, should be withdrawn.

II. The continuing rejection of claims 9, 11, 13, and 15 under 35 U.S.C. §103(a) as unpatentably obvious over Kobayashi (GB 2,349,388) in view of Tang et al. (US 4,769,292) is respectfully traversed.

1. Kobayashi et al. was discussed in the foregoing. Acknowledging the failings of Kobayashi et al., the Examiner relies on the disclosure of Tang et al. as teaching cyanine dyes for EL devices that have sulfur in the Y position and that read on Applicants' formula (3) so that the Examiner considers that it would have been obvious for an artisan to select from known cyanine dyes .

2. The Examiner does not justify the modification of the alkyl-substituted cyanine dyes of Kobayashi et al. with the heterocyclic cyanine dyes of Tang et al. other than to assert that it would be obvious to an artisan in the electroluminescent art to select from known cyanine dyes used in electroluminescent devices, i.e., a mere substitution of one cyanine dye for another with a reasonable expectation of success.

3. **Applicants respectfully disagree** that modification of Kobayashi et al. with the known heterocyclic cyanine dyes of Tang et al. is mere substitution. Applicants believe that one of ordinary skill in this art seeking to solve Applicants' problem and provide a blue color filter for an EL device would not consider heterocyclic cyanine dyes "analogous" to the methyl-substituted cyanine dyes of Kobayashi et al. because of an expectation of different properties, not similar properties as the Examiner maintains.

4. Applicants consider that only the hindsight gleaned from a perusal of Applicants' disclosure enabled the Examiner to find disclosure of heterocyclic cyanine dyes, and modify the disclosure of Kobayashi et al. with the heterocyclic cyanine dyes of Tang et al. to arrive at a

case of obviousness. Applicants consider that it is **not permissible to use such hindsight** where, as here, an artisan would not consider heterocyclic cyanine dyes “analogous” to the methyl-substituted cyanine dyes of Kobayashi et al. and would not have a reasonable expectation that heterocyclic materials would provide the solubility, transmissivity, and fluorescence properties, now recited in amended claims 9 and 13, sought in a blue color filter for EL devices.

5. The Examiner acknowledges that Kobayashi et al. modified by Tang et al. fails to mention that the first and second colorants completely dissolve in the binder resin.

6. The Examiner considers, however, that since Kobayashi et al./ Tang et al. and Applicants use “similar pigments”, the pigments used by Kobayashi et al./Tang et al. would also be expected to be completely soluble and meet Applicants’ claims.

7. Applicants respectfully disagree.

8. Independent claims 9 and 13 specify that the first colorant is a blue dye. Dyes are generally soluble in contrast to pigments which are generally insoluble. Thus, since Applicants’ first and second colorants are completely dissolved in the binder resin (a one phase system), the optical scattering that is typical when insoluble pigments are dispersed in a binder resin (a two phase system with interfaces) is advantageously reduced. Thus, the blue color filters of the present invention advantageously have improved transparency and contrast, as well as blue color purity, as demonstrated in the comparative tests presented in the Application. The desirability of this solubility feature is not disclosed in or suggested by Kobayashi et al./Tang et al.

9. As discussed above regarding the previous ground of rejection, the Examiner appears to be using interchangeably the terms “pigment” and “dye”, and “dispersing” (to obtain a two phase system) and “dissolving” (to obtain a one phase system) in a loose manner. Applicants note, however, that “pigments” are generally insoluble unlike “dyes” which are generally soluble. Thus, “pigments” form two phase dispersions while “dyes” are soluble and form one phase solutions. In support of these distinctions, Applicants’ attach EXHIBIT A, an excerpt from The Condensed Chemical Dictionary, Ninth Ed., G.G. Hawley, page 321 (see “dispersion”) and page 686 (see “pigments”).

10. Further, while Kobayashi et al., page 1, lines 1-2, teach a blue color filter that

includes a dye or pigment, Applicants found no disclosure in Kobayashi et al. of using colorants for blue color filters that are dissolved in the binder resin. For example, Kobayashi et al. page 8, lines 1 and 2, disclose use of the first cyanine dye of formula (1) as a dispersed pigment. Kobayashi et al. describe the first and second embodiments (see Kobayashi et al. pages 13 and 17-18, respectively) as made by spin coating a commercially-available photo-polymerizing resin containing a cyanine dye of formula (1) for the first embodiment and formulas (1) and (2) for the second embodiment, but Kobayashi et al. is not seen to teach using colorants for blue color filters that are dissolved in the binder resin or to suggest that an advantageously high contrast value would result from the colorants being dissolved in the binder resin rather than being or including dispersed pigment(s). The disclosure of Tang et al. is not seen to teach or suggest this feature and therefore does not supply the disclosure missing from Kobayashi et al.

11. For the reasons given in the foregoing, Applicants respectfully submit that the independent claims 9 and 13 clearly distinguish over the combined disclosures of Kobayashi et al. and Tang et al. so that no *prima facie* cases of obviousness against independent claims 9 and 13 has been made out, or against the claims depending from claims 9 and 13 for analogous reasons, so that this ground of rejection should be withdrawn.

12. In the alternative, Applicants believe that any *prima facie* cases of obviousness that may be deemed to exist is rebutted by the comparative test results presented on page 9-13 of the Application. The paragraph following Table 1 on page 13 of the Application discusses the significance of the comparative test results presented in the Application on pages 9-13 and summarized in Table 1. It is Applicants' position that the blue color filters of the present invention and the organic EL devices including the same have an unexpectedly high contrast value that is believed to result from the colorants being completely dissolved in the binder resin. Since this feature was neither taught nor suggested by Kobayashi et al./ Tang et al., it is Applicants' position that Applicants' comparative test results presented in the Application are sufficient to rebut any *prima facie* case of obviousness that may be deemed to exist. Thus,

13. In view of the foregoing distinctions and comments, Applicants respectfully submit that any *prima facie* cases of obviousness that may be deemed to exist has been rebutted by the comparative test results presented in the Application so that this ground of rejection of independent claims 9 and 13, and dependent claims 10-12 and 14-16 for analogous reasons,

should be withdrawn.

CONCLUSION

In view of the foregoing amendments and remarks, Applicants submit that claims 9-16 and the Application are in condition for allowance. Reconsideration and passage of this case to issue are therefore requested.


Should the Examiner consider that a conference would help to expedite the prosecution of this Application, the Examiner is invited to contact the undersigned to arrange for such an interview.

Request For Extension of Time

Applicants request a first extension of time for responding to the Office Action dated January 15, 2010. A first extension fee of \$130.00 is now due. This fee is submitted herewith in the attached credit card form PTO-2038. Should the remittance be accidentally missing or insufficient, the Commissioner is hereby authorized to charge the fee to our Deposit Account No. 18-0002 and is requested to advise us accordingly.

Respectfully submitted,

May 17, 2010
Date


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SMR/AJW:ac

EXHIBIT A

The
Condensed Chemical
Dictionary

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NINTH EDITION

Revised by

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Coeditor, Encyclopedia of Chemistry
Coauthor, Glossary of Chemical Terms



VAN NOSTRAND REINHOLD COMPANY

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Dispersed Sulfur 70.¹¹ Trademark for an aqueous dispersion of sulfur in the form of a flowable paste. Sulfur particles are virtually colloidal, averaging less than 2 microns in diameter.

Uses: Manufacture of water-base paints, compounding of latexes, sulfonation reactions in aqueous media; in general, for chemical processes requiring sulfur in the presence of water.

Disperse phase. See phase (2); colloid chemistry.

Dispersing agent. A surface-active agent (q.v.) added to a suspending medium to promote uniform and maximum separation of extremely fine solid particles, often of colloidal size. Applications include wet-grinding of pigments and sulfur; preparation of ceramic glazes; oil well drilling muds; insecticidal mixtures; carbon black in rubber; and water-insoluble dyes. True dispersing agents are polymeric electrolytes (condensed sodium silicates, polyphosphates, lignin derivatives); in nonaqueous media sterols, lecithin, and fatty acids are effective. See also emulsion; detergent.

Dispersion: (1) A two-phase system of which one phase consists of finely divided particles (often in the colloidal size range) distributed throughout a bulk substance, the particles being the disperse or internal phase and the bulk substance the continuous or external phase. Under natural conditions the distribution is seldom uniform, but under controlled conditions the uniformity can be increased by addition of wetting or dispersing agents (surfactants) such as a fatty acid. The various possible systems are: gas/liquid (foam), solid/gas (aerosol), gas/solid (foamed plastic), liquid/gas (fog), liquid/liquid (emulsions, solid/liquid paint), and solid/solid (carbon black in rubber). Some types, such as milk and rubber latex, are stabilized by a protective colloid which prevents agglomeration of the dispersed particles by an adherent coating. Solid-in-liquid colloidal dispersions (loosely called solutions) can be precipitated by adding electrolytes which neutralize the electrical charges on the particles. Larger particles will either gradually coalesce and rise to the top or settle out, depending upon their specific gravity. See also suspension; colloid chemistry.

(2) In the field of optics, dispersion denotes the retardation of a light ray, usually resulting in a change of direction, as it passes into or through a substance. The extent of this effect depending on the frequency. Dispersion is a critically important property of optical glass. See also refractive index.

Dispersite.²⁴ Trademark for water dispersions of natural, synthetic, and reclaimed rubbers and resins.

Uses: Adhesives for textiles, paper, shoes, leather, tapes; coatings for metal, paper, fabrics, carpets; protective (strippable) for saturating paper, felt, book covers, tape, jute pads; for dipping tire cords. Can be applied by spraying, spreading, impregnation, saturation.

Disperso.¹⁶⁴ Trademark for wettable grades of zinc, calcium and other metallic stearates. Used where easy dispersion in water is desired.

Dispersol OS.²³⁶ Trademark for an oil-soluble emulsifying agent comprised of an 8% solution of a polyethenoxy compound in isopropanol. Designed especially for dispersion of oil spills in sea water. Claimed to be biodegradable and to have low toxicity

for fish and other marine organisms. Amount needed said to be from 20 to 25% of the oil volume.

"Dispersol" VL.¹²⁵ Trademark for an ethylene oxide condensate. Nonionic dispersant and retardant for vat dyes and dispersant for acetate dyes. 20% aqueous solution.

displacement series. See activity series.

disproportionation. A chemical reaction in which a single compound serves as both oxidizing and reducing agent, and is thereby converted into a more oxidized and a more reduced derivative. Thus a hypochlorite upon appropriate heating yields a chlorate and a chloride, and an ethyl radical formed as an intermediate is converted into ethane and ethylene. See also transalkylation.

dissociation. The process by which a chemical combination breaks up into simpler constituents as a result of either (1) added energy, as in the case of gaseous molecules dissociated by heat, or (2) the effect of a solvent on a dissolved substance, e.g., water on hydrogen chloride. It may occur in the gaseous, solid, or liquid state, or in solution. All electrolytes dissociate to a greater or less extent in polar solvents. The degree of dissociation can be used to determine the equilibrium constant for dissociation, an important factor in ascertaining the extent of a chemical process. See also ionization.

dissolved oxygen (D.O.). One of the most important indicators of the condition of a water supply for biological, chemical and sanitary investigations. Adequate dissolved oxygen is necessary for the life of fish and other aquatic organisms and is an indicator of corrosivity of water, photosynthetic activity, septicity, etc. See also biochemical oxygen demand.

distearylamine (dioctadecylamine) (C₁₈H₃₇)₂NH.

Properties: Solid; sp. gr. 0.85; m.p. 69°C. Almost insoluble in water.

Use: Intermediate.

2,6-distearyl-para-cresol (2,6-dioctadecyl-para-cresol)

(C₁₈H₃₇)₂CH₂C₆H₃OH. A viscous pale yellow liquid; soluble in most nonpolar solvents; refractive index 1.4825-1.4855 (25°C). Combustible.

Uses: Antioxidant; heat stabilizer for polypropylene.

distearyl ether (dioctadecyl ether) (C₁₈H₃₇)₂O.

Properties: Solid; m.p. 58-60°C; b.p.; decomposes.

Grade: 95% (min) purity.

Uses: Electrical insulators; water repellents; lubricants in plastic molding and processing; antistatic agent; intermediates.

distearyl sulfide (dioctadecyl sulfide; distearyl thioether) (C₁₈H₃₇)₂S.

Properties: Solid; m.p. 68-69°C; b.p., decomposes; sp. gr. 0.8148 (70/4°C).

Grades: 95% (min) purity.

Uses: Organic synthesis (formation of sulfonium compounds).

distearyl thiodipropionate (3,3'-dioctadecyl thiodipropionate; thiodipropionic acid, distearyl ester)

(C₁₈H₃₇)₂OOCCH₂CH₂S.

Properties: White flakes, m.p. 58-62°C; m.p. 55°C.

Insoluble in water; very soluble in benzene and olefin polymers. Resistant to heat and hydrolysis. Low toxicity.

Uses: Antioxidant; plasticizer; softening agent.

PICRAMIC ACID

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Uses: Manufacture of polyamides, epoxy curing agents, carbinols, and amine polyols.

picramic acid (picraminic acid; 2-amino-4,6-dinitrophenol; dinitroaminophenol) $C_6H_3(NO_2)_2(NH_2)OH$. Properties: Red crystals. Soluble in alcohol, benzene, glacial acetic acid, aniline, and ether; sparingly soluble in water. M.p. 168°C.

Derivation: By partial reduction of picric acid. Hazard: May explode when shocked or heated. Dangerous fire risk.

Uses: Azo dyes; indicator; reagent for albumin. Shipping regulations: (Rail) Consult regulations. (Air) Not listed. Consult authorities.

picramide. Legal label name (Air) for trinitroaniline (q.v.).

picraminic acid. See picramic acid.

picric acid (picronitric acid; trinitrophenol; nitroxanthic acid; carbazotic acid; phenoltrinitrate) $C_6H_3(NO_2)_3OH$.

Properties: Yellow crystals or liquid. Soluble in water, alcohol, chloroform, benzene, and ether. Very bitter taste. Sp. gr. 1.767; m.p. 122°C. Explodes at 300°C (572°F); flash point 302°F.

Derivation: Nitration of phenolsulfonic acid, obtained by heating phenol with concentrated sulfuric acid. Grades: Technical paste; pure paste.

Containers: 1-, 5-lb. bottles; 25-lb. boxes; 100-lb. kegs; 300-lb. barrels.

Hazard: Severe explosion risk when shocked or heated; especially reactive with metals or metallic salts. Toxic by skin absorption. Tolerance, 0.1 mg per cubic meter of air.

Uses: Explosives; medicine (external); dyes; matches; electric batteries; etching copper; dyeing and printing textile fabrics with compound dyes which contain also such dyes as benzaldehyde green; methyl violet and indigo carmine; picrates.

Shipping regulations: (Rail) Consult regulations. (Air) Dry or wet with less than 10% water. Not acceptable. Wet with not less than 10% water. Flammable Solid label.

picrolonic acid $NO_2C_6H_4NNC(CH_3)C(NO_2)COOH$. 3-Methyl-4-nitro-1-(para-nitrophenyl)-5-pyrazolone.

Properties: Yellow leaflets; m.p. 116-117°C; decomposes 125°C; slightly soluble in water; soluble in alcohol.

Uses: Reagent for alkaloid identifications, for tryptophan and phenylalanine; for the detection and estimation of calcium.

picronitric acid. See picric acid.

picrotoxin (cocculin) $C_{30}H_{48}O_{11}$. A glucoside.

Properties: Flexible shining, prismatic crystals or microcrystalline powder; odorless; very bitter taste; stable in air; affected by light; m.p. 200°C. Soluble in boiling water, boiling alcohol, diluted acids and alkalis; sparingly soluble in ether and chloroform.

Derivation: Derived from the fruit of *Anamirta paniculata* or *cocculus indicus*, fishberries.

Hazard: Highly toxic in overdose.

Use: Medicine, as CNS stimulant and antidote for barbiturate poisoning.

Shipping regulations: (Air) Cocculus, solid, Poison label.

picryl chloride (2-chloro-1,3,5-trinitrobenzene)

$C_6H_2(NO_2)_3Cl$. A high explosive.

Hazard: Severe explosion and fire risk.

Shipping regulations: (Rail) Consult regulations. (Air)

(wet with not less than 10% water) Flammable Solid label; (dry, or wet with less than 10% water) Not acceptable.

"Pictol."¹²⁹ Trademark for monomethyl para-aminophenol sulfate, photo-developer.

PIDA. Abbreviation for phenylindane dicarboxylic acid. See 1,1,3-trimethyl-5-carboxy-3-(p-carboxyphenyl) indane.

Pidgeon process (ferrosilicon process; silicon process). Process for the production of high-purity magnesium metal from dolomite or magnesite by reduction with ferrosilicon at 1150°C and high vacuum.

piezochemistry. Study of reactions occurring at high pressure, e.g., in interior of the earth's crust.

piezoelectricity. Opposite electric charges acquired by certain crystals on different surfaces as a result of mechanical stresses. Conversely, the property of expansion along one axis and contraction along another when subjected to an electric field.

pig iron. Product of blast-furnace reduction of iron oxide in presence of limestone. About half the iron is converted to iron. Average analysis is: 1% carbon, 0.03% sulfur, 0.27% phosphorus, 2.4% manganese, 4.6% carbon, balance iron. Pig iron is the basic material for steel (q.v.) and cast iron. In metallurgical terminology, a "pig" is a bar or ingot of cooled molten iron. See also iron.

pigment. Any substance, usually in the form of a fine powder, that imparts color to another substance or mixture. Most pigments are insoluble in organic solvents and water; exceptions are the natural organic pigments, such as chlorophyll, (q.v.) which are generally organosoluble. To qualify as a pigment, a material must have positive colorant value. This definition excludes whitening, barytes, clays, and talc fillers, extenders. Some pigments (zinc oxide, carbon black) are also reinforcing agents, but the terms are not synonymous; in the parlance of the paint and rubber industries these distinctions are not always observed.

Pigments may be classified as follows:

- I. Inorganic
 - (a) metallic oxides (iron, titanium, zinc, cadmium, chromium).
 - (b) metal powder suspensions (gold, aluminum, silver).
 - (c) earth colors (siennas, ochers, umbers).
 - (d) lead chromates
- II. Organic
 - (a) animal (rhodopsin, melanin).
 - (b) vegetable (chlorophyll, xanthophyll, carotene, flavone, carotene). See also pigment, plant.
 - (c) mineral (carbon black).
 - (d) synthetic (phthalocyanine, lithols, toluidine, para red, toners, lakes, etc.).

See also dye, natural and synthetic.

"Pigmentar."¹²⁹ Trademark for tar products derived from the distillation and decomposition of olefinous southern pine. Produced to various viscosity grades. Used in rubber compounding and retarding, marine paints and roof coatings.

Pigment Blue 15 $C_{12}H_8N_2Cu$. A bright blue copper phthalocyanine pigment (q.v.). C.I. No. 74160. Preparation: By heating phthalonitrile with copper chloride.

Uses: In paints; alkyd resin enamels; printing inks; lacquers; rubber; resins; papers; tinplate printing; colored chalks and pencils.